ly, and thus see for themselves the sad results of vague speculation; they must learn by direct experiment that there is such a thing in the world as truth, and that their own mind is most liable to error; they must try experiment after experiment, and work problem after problem, until they become men of action, and not of theory.

This, then, is the use of the laboratory in general education, — to train the mind in right modes of thought by constantly bringing it in contact with absolute truth, and to give it a pleasant and profitable exercise, which will call all its powers of reason and imagination into play. Its use in the special training of scientists needs no remark, for it is well known that it is absolutely essential. The only question is, whether the education of specialists in science is worth undertaking at all; and of these I have only to consider natural philosophers or physicists. I might point to the world around me, to the steam-engine, to labor-saving machinery, to the telegraph, to all those inventions which make the present age the 'age of electricity,' and let that be my answer. Nobody could gainsay that the answer would be complete; for all are benefited by these applications of science, and he would be considered absurd who did not recognize their value. These follow in the train of physics, but they are not physics: the cultivation of physics brings them, and always will bring them; for the selfishness of mankind can always be relied upon to turn all things to profit. But in the education pertaining to a university we look for other results. The special physicist trained there must be taught to cultivate his science for its own sake. He must go forth into the world with enthusiasm for it, and try to draw others into an appreciation of it, doing his part to convince the world that the study of nature is one of the most noble of pursuits, that there are other things worthy of the attention of mankind besides the pursuit of wealth. He must push forward, and do what he can, according to his ability, to further the progress of his science.

Thus does the university, from its physical laboratory, send forth into the world the trained physicist to advance his science, and to carry to other colleges and technical schools his enthusiasm and knowledge. Thus the whole country is educated in the subject, and others are taught to devote their lives to its pursuit, while some make the applications to the ordinary pursuits of life that are appreciated by all.

But for myself I value in a scientific mind most of all that love of truth, that care in its pursuit, and that humility of mind, which makes the possibility of error always present more than any other quality. This is the mind which has built up modern science to its present perfection, which has laid one stone upon the other with such care that it to-day offers to the world the most complete monument to human reason. This is the mind which is destined to govern the world in the future, and to solve problems pertaining to politics and humanity as well as to inanimate nature.

It is the only mind which appreciates the imperfections of the human reason, and is thus careful to guard against them. It is the only mind that values the truth as it should be valued, and ignores all personal feeling in its pursuit. And this is the mind the physical laboratory is built to cultivate.

HENRY A. ROWLAND.

THE FORMATION OF STRUCTURELESS CHALK BY SEAWEEDS.

CHALK has hitherto been believed to be a deep-sea formation only, made up of a fine ooze or mud at great depths, and undoubtedly, so far as the extensive cretaceous deposits are concerned, the explanation is the correct one; but recent observations by Mr. J. Walther on the chalk-secreting algae of the Mediterranean show that its formation often occurs in shallow water. It has been known for some time that the nullipores were chalk-secreting algae, and that under certain conditions, as in the formation of coral islands, they took more or less part in the production of rock. Where their remains are found in any abundance, chalk formations are readily enough ascribed to their agency, but it is now shown that more or less extensive beds, or rather banks, of wholly structureless chalk, whose origin has been oftentimes enigmatical, may be entirely due to seaweeds.

Mr. Walther observed certain forms (Lithothamnia) in different places in the Gulf of Naples, growing luxuriantly at a depth of from one to three hundred feet below the surface, and traced out the relation between the masses of dead residual matter and the incompletely transformed beds of fossil chalk. These Lithothamniae have a remarkably small proportion of organic material (not more than five or six per cent), nearly the entire substance consisting of mineral matter, chiefly carbonate of lime. The plants reach only the size of one's fist, and do not change their form at death, owing to the small quantity of decaying matter they contain. The living plants secure attachment to the dead ones, forming extensive beds. The numerous stout branches of less than a fourth of an inch in length admit of only small interstices; in slow-growing beds inequalities and shallow depressions may be filled with layers of detritus.

The organic structure disappears to a greater or

less extent, often wholly, so that the chalk becomes entirely structureless; and it has been shown that the absence of structure becomes more apparent in proportion to the greater thickness of beds formed. The further transformation was traced by Walther in a recent tertiary formation at Syracuse, where he found, in the exposed quarries of Latomia dei Capuccini, the remains of Lithothamnia sufficiently distinct for determination, especially where the interstitial material had been weathered out. The stone, however, blended from this indistinctly structural form to the wholly structureless or homogeneous.

The explanation of this complete transformation, as given by the author, is also of interest. The organic substances, which in the living plant amount to about five or six per cent, were found, in the tertiary chalk above referred to, to be about a third of one per cent. The larger part had thus disappeared; and as the chalk was purely white, showing the absence of all bituminous matter, it was evident that the remaining organic matter had slowly been oxidized, producing carbonic matter, which had obliterated by its dissolving action in the surrounding or percolating water all evidences of structure. In such cases where the plants were exposed to water not impregnated with the carbonic acid, the structure is retained more or less unimpaired.

This explanation of the formation of chalk in shallow waters — for algae must live within a few hundred feet of the surface, where light can reach them — gives a solution of various problems in geology, especially of the more recent chalk-beds. Whether it will apply to the extensive structureless chalk-beds of western Kansas at all, is doubtful.

CYPRUS UNDER BRITISH RULE.

At a recent meeting of the Society of arts, in London, Mr. G. Gordon Hake read a paper on the condition of Cyprus since its occupation by the British, his object being to show the improvements that have taken place under the new administration.

In ancient times Cyprus was one of the most fertile and prosperous countries in the world, its copper and its timber being important articles of commerce. But under the Turkish administration the island deteriorated greatly, as most countries do under Turkish rule. One traveller, near the end of the last century, describes Famagusta, at the time of his visit, as a "melancholy picture of Turkish desolation," and as "almost depopulated, although, in the time of the Venetians, the finest city in the island, and renowned for its brave defence against the infidels." He adds, "The desolation we observed at Famagusta extended itself along the country. We passed by the ruins of several Greek villages." Another traveller also gives a sad account of Cyprus at a rather later date. "The island," he says, "was formerly one of the richest and most fertile in the world. It is much exposed to the ravages of locusts. On their approach, every kind of verdure disappears, and they even gnaw the very bark off the trees. The Turks will not permit their destruction, because they consider them as sent by the Almighty."

This melancholy condition of the island was due in part to maladministration of justice, and in part to a vicious system of taxation. The Turkish government took tithes of the produce of the land, and these tithes were farmed in the spring of each year to merchants and speculators. This system had its natural results in a loss of revenue to the state, and the impoverishment of the cultivator, whom it involved in the toils of the money-lender, as well as the tithe-farmer, and thus checked the productiveness of the island to an enormous extent. The land, falling out of cultivation, became the breeding-ground of locusts. The cultivators of the soil in many cases gave up their calling in despair, and obtained a living by cutting down and selling trees, and the collection of resin. The wholesale destruction of trees reacted on the climate, and restricted the rainfall; so that between locusts, tithe-farmers, and neglect of the forests, the island, at the time of the occupation, was rapidly becoming more like a barren, rocky desert than a fertile and naturally favored country.

These, then, were the chief evils to be remedied by the English on their arrival in Cyprus. It was at once made plainly known that no farming of tithes would be allowed under British rule; and it was decided to adopt the following course in regard to the same. The Turkish plan of assessment was to be followed, but, instead of collecting the tithes in kind, they were to be valued, and, leaving the peasant free to deal with his crop as he pleased, the money value was to be collected as an ordinary tax later in the year. The sole exceptions to this were the tithes on silk and carobs. The greater portion of these two products being exported from the island, it was arranged to collect the tithe on export, and so save the cost of assessment; and the result, besides being successful from the imperial point of view, has given great satisfaction to the agriculturists.

After this financial reform the locust and timber questions remained to be dealt with. The Cyprus locust is indigenous to the island; and its presence is, without doubt, largely due to past